# Volunteer Lake Assessment Program Individual Lake Reports

## PROVINCE LAKE, EFFINGHAM, NH

**MORPHOMETRIC DATA**

| | | | | | |
|---|---|---|---|---|---|
| **Watershed Area (Ac.):** | 4,672 | **Max. Depth (m):** | 4.9 | **Flushing Rate (yr$^{-1}$)** | 1 |
| **Surface Area (Ac.):** | 1014 | **Mean Depth (m):** | 2.8 | **P Retention Coef:** | 0.77 |
| **Shore Length (m):** | 8,500 | **Volume (m$^3$):** | 11,268,500 | **Elevation (ft):** | 480 |

**TROPHIC CLASSIFICATION**

| Year | Trophic class |
|---|---|
| 1987 | OLIGOTROPHIC |
| 2006 | MESOTROPHIC |

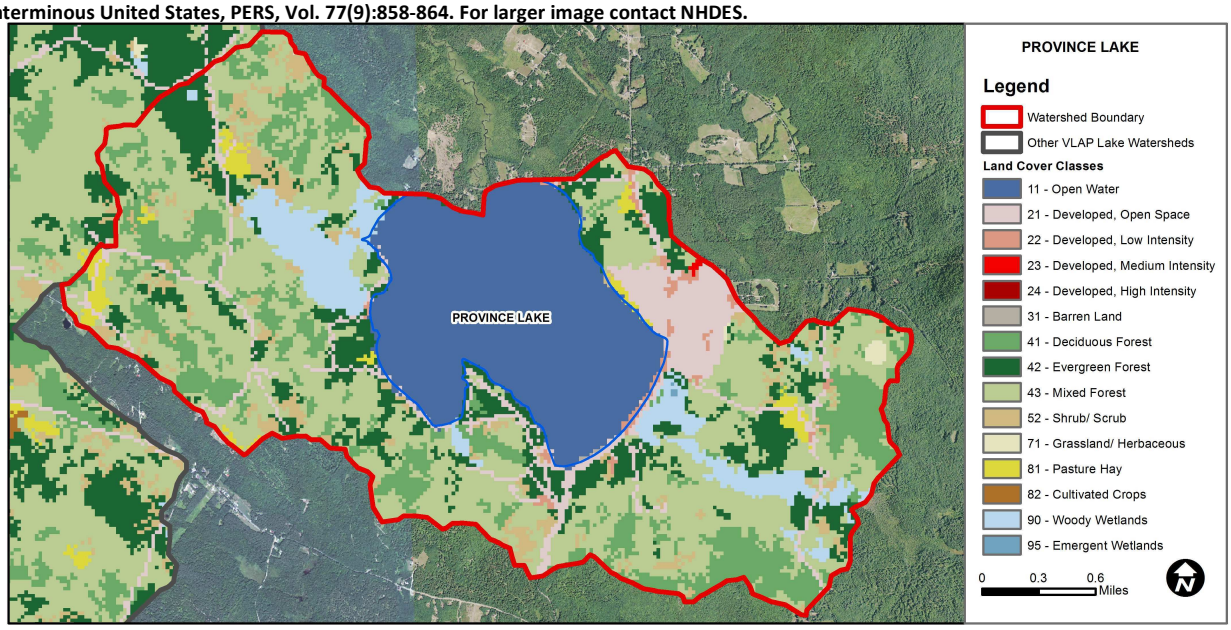
**KNOWN EXOTIC SPECIES**

**The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.**

| Designated Use | Parameter | Category | Comments |
|---|---|---|---|
| Aquatic Life | Phosphorus (Total) | Slightly Bad | The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded. |
| | pH | Slightly Bad | >10% of samples exceed criteria by a small margin (minimum of 2 exceedances). |
| | Oxygen, Dissolved | Encouraging | There are < 10 samples with 0 exceedances of criteria. More data needed. |
| | Dissolved oxygen satura | Cautionary | There are < 10 samples with 1 exceedance of criteria. More data needed. |
| | Chlorophyll-a | Slightly Bad | The calculated median is from 5 or more samples and is > indicator. |
| Primary Contact Recreation | Escherichia coli | Good | There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance. |
| | Cyanobacteria hepatoto | Slightly Bad | Cyanobacteria bloom(s). |
| | Chlorophyll-a | Very Good | There are a total of at least 10 samples with 0 exceedances of indicator. |

**WATERSHED LAND USE SUMMARY**

**Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.**

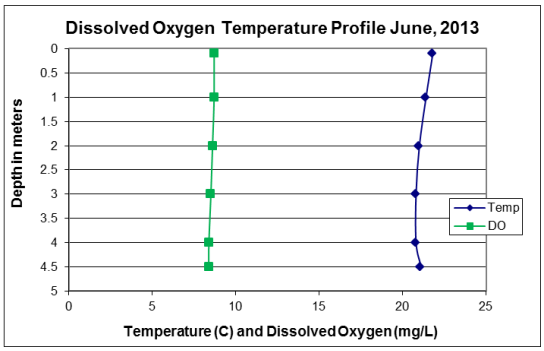



| Land Cover Category | % Cover | Land Cover Category | % Cover | Land Cover Category | % Cover |
|---|---|---|---|---|---|
| Open Water | 20.5 | Barren Land | 0.04 | Grassland/Herbaceous | 0.2 |
| Developed-Open Space | 7.27 | Deciduous Forest | 13.94 | Pasture Hay | 1.53 |
| Developed-Low Intensity | 0.88 | Evergreen Forest | 11.4 | Cultivated Crops | 0 |
| Developed-Medium Intensity | 0.05 | Mixed Forest | 33.78 | Woody Wetlands | 5.98 |
| Developed-High Intensity | 0 | Shrub-Scrub | 4.38 | Emergent Wetlands | 0.02 |

# VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
## PROVINCE LAKE, EFFINGHAM, NH
## 2013 DATA SUMMARY

**OBSERVATIONS AND RECOMMENDATIONS** (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **CHLOROPHYLL-A:** Chlorophyll levels were relatively low throughout the season and less than the state median; however a cyanobacteria bloom did occur in June. Chlorophyll was higher in June and July and decreased slightly in August and September. Historical trend analysis indicates stable chlorophyll with low variability between years.
- **CONDUCTIVITY/CHLORIDE:** Deep spot and tributary conductivity were relatively low and approximately equal to the state medians. However, historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity since monitoring began.
- **E. COLI:** Hobbs Brook E. coli levels were slightly elevated in June but less than the state standard for surface waters.
- **TOTAL PHOSPHORUS:** Deep spot phosphorus levels were lowest in June and peaked in July and September. Average phosphorus levels were approximately equal to the state median and slightly less 2012 levels. Historical trend analysis indicates stable epilimnetic phosphorus with low variability between years. Island Inlet and Rt. 153 Inlet experienced slightly elevated phosphorus potentially from wetland influences.
- **TRANSPARENCY:** Lake transparency improved again in 2013 and average transparency was greater than 2.0 meters on each sampling event. Transparency was best in August when chlorophyll levels were lowest. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- **TURBIDITY:** Deep spot and Outlet turbidity were slightly elevated on most sampling events either from algal growth, suspended sediments from boating activity, or stormwater runoff from recent rain events.
- **PH:** Deep spot pH was sufficient to support aquatic life and within the desired range of 6.5 - 8.0 units. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years.
- **RECOMMENDED ACTIONS:** The Province Lake Association received funding to develop a Watershed Management Plan to address the aquatic life use and primary contact recreation impairments. Intense tributary sampling occurred throughout the summer of 2013 to assist in developing nutrient load estimates. Those data were not included in this report. Keep up the great work!



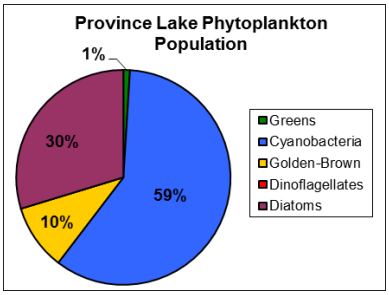




Table 1. 2013 Average Water Quality Data for PROVINCE LAKE

| Station Name | Alk. | Chlor-a | Chloride | E. coli | Cond. | Total P | Trans. | | Turb. | pH |
|---|---|---|---|---|---|---|---|---|---|---|
| | mg/l | ug/l | mg/l | #/100ml | uS/cm | ug/l | m | | ntu | |
| | | | | | | | NVS | VS | | |
| Campground Inlet | | | | | 34.3 | 7 | | | 0.23 | 6.81 |
| Epilimnion | 6.78 | 2.88 | 6 | | 45.9 | 12 | 2.73 | 2.86 | 1.80 | 6.88 |
| Hobbs Brook | | | | | 27.1 | 12 | | | 0.77 | 6.27 |
| Hypolimnion | | | | 63 | 46.6 | 12 | | | 1.85 | 6.80 |
| Island Inlet | | | | | 43.3 | 16 | | | 1.02 | 6.49 |
| Lower Campground | | | 3 | | 38.9 | 11 | | | 0.52 | 6.47 |
| Outlet | | | | | 46.1 | 11 | | | 1.56 | 6.98 |
| Rte 153 Inlet | | | 3 | | 35.7 | 18 | | | 0.65 | 6.01 |

**NH Water Quality Standards:** Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
**Chloride:** < 230 mg/L (chronic)
**E. coli:** > 88 cts/100 mL – public beach
**E. coli:** > 406 cts/100 mL – surface waters
**Turbidity:** > 10 NTU above natural level
**pH:** 6.5-8.0 (unless naturally occurring)

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.
**Alkalinity:** 4.9 mg/L
**Chlorophyll-a:** 4.58 mg/m$^3$
**Conductivity:** 40.0 uS/cm
**Chloride:** 4 mg/L
**Total Phosphorus:** 12 ug/L
**Transparency:** 3.2 m
**pH:** 6.6

## HISTORICAL WATER QUALITY TREND ANALYSIS

| Parameter | Trend | Explanation | Parameter | Trend | Explanation |
|---|---|---|---|---|---|
| pH | Stable | Trend not significant; data moderately variable. | Chlorophyll-a | Stable | Trend not significant; data show low variability. |
| Conductivity | Degrading | Data significantly increasing. | Transparency | Stable | Trend not significant; data moderately variable. |
| | | | Phosphorus (epilimnion) | Stable | Trend not significant; data show low variability. |